USFS DISTURBED WEPP BATCH PROGRAM - Instructions

2018.04.06

Model description

The ***Disturbed WEPP Batch Program*** is an interface to the Water Erosion Prediction Project soil erosion model (WEPP) to allow you to easily describe disturbed forest and rangeland erosion conditions. The interface summarizes the results and presents the probability of a given level of erosion (return period) occurring the year following a disturbance. ***Disturbed WEPP*** is linked to the Rock:Clime climate generator, which has a database of climate statistics for more than 2600 weather stations. The climate also can be refined for a specific location, optionally with PRISM data.

Model documentation

Disturbed WEPP Documentation

Description of pages

Page Name	Description
Instructions	Guidance on how to use the program
Inputs	Select input parameters for the Disturbed WEPP model
Hillslope Data	Enter hillslope data manually or import hillslope file created using GIS toolbox
Summary Results	Average and cumulative results for all the hillslopes
Hillslope Results	Results for each hillslope
Match Types	Match GIS hillslope file soil and treatment types to Disturbed WEPP types
Reference	Reference information on how to select soil texture, treatment, rock percentage, and gradient values for hillslope data

Internet Connection	The program requires an internet connection to work.
Climates	Upon opening, the climates associated with the computer's current IP address will be retrieved from the USFS server and listed in the Climate list box on the Inputs page. If no climates are listed, then the user must add the desired climates before running a batch. To add a climate: 1. On the Inputs page, click on the **Create New Climate** button. A browser window will open up showing the Rock:Clime climate generator web page. 2. In the browser window, select a state and then a climate station. 3. To use the standard climate without any modifications, click on the **ADD TO PERSONAL CLIMATES** button. 4. To create a custom climate, click on the **MODIFY CLIMAT**E button and modify the climate as desired. 5. On the Inputs page of this spreadsheet, click on the **Refresh Climate List** button.
Hillslope Data	Before running Disturbed WEPP, the user will need to enter data for all hillslopes to be modeled. If you have generated hillslope data using the GIS toolbox, click on the **Import GIS Hillslope File** button on the **Inputs** sheet. The program will load the hillslope data from the selected file into the **Hillslope Data** sheet. For manual data entry, select the **Hillslope Data** tab and type in the desired values. Do not cut and paste data from a different spreadsheet. Some of the fields are limited to specific values, and if you try to paste data into those cells that do not match the prescribed list, an error

	message will occur.
Reference	The **Reference** page contains background information for selecting soil texture, treatment, rock percentage, and hillslope gradients.
Saving Results	If you wish to save the detailed results for each hillslope, select **Yes** next to **Save Results?** on the **Inputs** page. The results for each hillslope will be saved to an HTML file. The result files will be saved to a sub-directory called *Disturbed WEPP Results* in the directory that contains the local Disturbed WEPP Batch program file.
Interpreting Results	A summary of the results is provided on the **Summary Results** page. This page provides average and total results for all hillslopes modeled. The average result is the average erosion or sediment rate per unit area for all the hillslopes. The total values are calculated by multiplying the estimated erosion/sediment delivery rates for each hillslope by their corresponding area and then summing up those values to yield the total erosion or sediment in English or metric tons for all of the hillslopes. To view results from a single run, select the Hillslope ID from the drop down box on the **Summary Results** page. The results will be displayed in box below the drop down box. The hillslope results also can be viewed on the **Hillslope Results** page.
Update/send comments	http://forest.moscowfsl.wsu.edu/fswepp/batch/dWb.html
Citation	Elliot, William J.; Hall, David E. 2010. Disturbed WEPP Model 2.0. Ver. 2011.11.22. Moscow, ID: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. Online at <http://forest.moscowfsl.wsu.edu/fswepp>.

USFS DISTURBED WEPP BATCH PROGRAM - Inputs

Project Name Pete King

Location Lochsa/Powell RD

Watershed Lochsa River (optional)

Units ○ Metric ◉ English

Save Results? ○ Yes ◉ No

Select *Yes* to save individual run results as external HTML files. Result files will be saved to the same directory as the current spreadsheet.

Step 1. Select Personality **(click for explanation)** a-z (optional)

Step 2. Select Climate

Refresh Climates

Create New Climate

If there are no climates listed in the Climate List, click on the **Refresh Climates** button. If there are still no climates after updating, then the program could not find any climates associated with your computer's current IP address and personality; please create climates through the FS WEPP webpage forest.moscowfsl.wsu.edu/fswepp
Start Disturbed WEPP, and create or modify a climate, then click on the Refresh Climates button here to refresh.

Step 3. Hillslope Data Entry/Import

Import GIS Hillslope File

Enter Hillslope Data Manually

Click on **Import GIS Hillslope File** to import data created by the GIS Hillslope Toolbox. To manually enter Hillslope data, click on **Enter Hillslope Data Manually**.

Step 4. Select Years of Simulation 50

Step 5. Click Button To Run Batch

Run Disturbed WEPP

USFS DISTURBED WEPP BATCH PROGRAM - Hillslope Data

Clear Hillslope Data | Show Column Descriptions

DO NOT INSERT OR DELETE ROWS OR COLUMNS ON THIS SHEET

Place mouse arrow over column header text for more information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
				Upper							Lower						
Hillslope Code	GIS Soil Type	Soil Texture	Area (acres)	GIS Treatment	Treatment/ Vegetation	Horizontal Slope Length (feet)	Gradient % Top	Gradient % Bottom	Cover %	Rock %	GIS Treatment	Treatment/ Vegetation	Horizontal Slope Length (feet)	Gradient % Top	Gradient % Bottom	Cover %	Rock %
Required	Optional	Required	Required	Optional	Required	Required	Required	Required	Required	Required	Optional	Required	Required	Required	Required	Required	Required
Typical - Tractor/Loam		loam	336.000		20 Year Old Forest	1200	37.00	37.00	95	20		20 Year Old Forest	100	55.00	55.00	95	20
Typical - Tractor/Sandy L		sandy loam	209.000		20 Year Old Forest	1200	37.00	37.00	95	20		20 Year Old Forest	100	55.00	55.00	95	20
Typical - Skyline/Loam		loam	928.000		20 Year Old Forest	1200	49.00	49.00	95	20		20 Year Old Forest	100	55.00	55.00	95	20
Typical - Skyline/Sandy L		sandy loam	303.000		20 Year Old Forest	1200	50.00	50.00	95	20		20 Year Old Forest	100	55.00	55.00	95	20
Typical - Skyline/Silt Loa		silt loam	5.000		20 Year Old Forest	1200	5.00	5.00	95	20		20 Year Old Forest	100	55.00	55.00	95	20
Typical - Heli/Loam		loam	1338.000		20 Year Old Forest	1200	56.00	56.00	95	20		20 Year Old Forest	100	55.00	55.00	95	20
Typical - Heli/Sandy Loa		sandy loam	343.000		20 Year Old Forest	1200	56.00	56.00	95	20		20 Year Old Forest	100	55.00	55.00	95	20
Typical - Heli/Silt Loam		silt loam	2.000		20 Year Old Forest	1200	55.00	55.00	95	20		20 Year Old Forest	100	55.00	55.00	95	20
Typical - Rx Fire/Loam		loam	3370.000		Shrubs	1200	62.00	62.00	80	20		20 Year Old Forest	100	55.00	55.00	95	20

Match GIS Hillslope File Soil and Treatment Types to Disturbed

Match Soil Types

Match the soil type from the GIS Hillslope file in the left column to the corresponding Disturbed WEPP soil type (clay loam, silt loam, sandy loam, loam). Each cell in the right column contains an embedded drop down list with the four soil type options. Click on a cell to view the drop down list.

Hillslope File Soil Type	Disturbed WEPP Soil Type

Match Treatn

Match the treatment typ
to the corresponding D
Each cell in the right co
with the treatment type
list.

Enter the cover % asso

Hillslope File Treatment Type

l WEPP Types

ıment/Vegetation Types and Cover %

ɔe from the GIS Hillslope file in the left column
isturbed WEPP treatment/vegetation type.
olumn contains an embedded drop down list
options. Click on a cell to view the drop down

ciated with each treatment type

Click on the Update Types button after you are finished matching the soil and treatment types. The macro will automatically fill in the hillslope data sheet with the matched types

Update Types

Disturbed WEPP Treatment /Vegetation Type	Average Cover % for Treatment Type

USFS DISTURBED WEPP BATCH PROGRAM - Summary Results

Project Name	Pete King
Location	Lochsa/Powell RD
Watershed	Lochsa River
Climate Summary	Modified by Rock:Clime on February 24, 2020 from FENN RS ID 103143 0 T MAX 35.45 42.78 50.69 61.34 70.27 78.31 88.83 88.66 76.43 60.76 44.95 36.85 deg F T MIN 22.73 26.78 30.14 35.15 41.30 47.68 51.17 50.14 44.09 36.55 30.74 25.51 deg F MEANP 4.53 3.16 3.61 3.52 3.37 2.98 1.07 1.47 2.29 2.76 3.90 3.88 in # WET 16.17 13.18 15.06 13.52 12.96 11.47 5.93 6.11 7.64 9.84 15.00 15.50 days Latitude 46.20 Longitude 115.66 Elevation 2818.0 ft
Total Hillslope Area	8147.00 acres consisting of 11 hillslopes

Mean Annual Averages for Watershed

Precipitation	37.4	inches
# of storms	7110	
Average runoff from rainfall	0.05	inches
Average # of runoff events	9	
Average snowmelt runoff	0.23	inches
Average # of snowmelt runoff events	46	

	Average tons/acre	Total tons
Upland Erosion	0.01	115.1
Sediment Delivery	0.01	110.46

Return Period Analysis

	Average (tons/acre)		Total (tons)	
	Erosion	Sediment Delivery	Erosion	Sediment Delivery
50 year	0.24	0.24	2660.89	2660.97
25 year	0.11	0.09	1515.42	1173.28
10 year	0.02	0.01	170.56	53.44
5 year	0.00	0.00	3.44	5.43
2.5 year	0.00	0.00	0.00	0.02
Average	0.01	0.01	126.38	109.81

Probability of Occurrence in First Year Following Disturbance

	Probability Range	
Runoff	6 - 74	%
Erosion	0 - 34	%

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USFS DISTURBED WEPP BATCH PROGRAM - Hillslope Results

DO NOT INSERT/DELETE ROWS OR COLUMNS ON THIS SHEET

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DO NOT INSERT/DELETE ROWS OR COLUMNS ON THIS SHEET

INPUTS

Hillslope Code	Soil Texture	Area	UPPER Treatment	UPPER Slope Length	UPPER Gradient Top	UPPER Gradient Bottom	LOWER Treatment	LOWER Slope Length	LOWER Gradient Top	LOWER Gradient Bottom
		acres		feet	%	%		feet	%	%
al - Tractor/	loam	336	20 Year Old Forest	1200	37	37	20 Year Old Forest	100	55	55
Tractor/Sa	sandy loam	209	20 Year Old Forest	1200	37	37	20 Year Old Forest	100	55	55
al - Skyline	loam	928	20 Year Old Forest	1200	49	49	20 Year Old Forest	100	55	55
Skyline/Sa	sandy loam	303	20 Year Old Forest	1200	50	50	20 Year Old Forest	100	55	55
- Skyline/S	silt loam	5	20 Year Old Forest	1200	5	5	20 Year Old Forest	100	55	55
ical - Heli/L	loam	1338	20 Year Old Forest	1200	56	56	20 Year Old Forest	100	55	55
- Heli/Sanc	sandy loam	343	20 Year Old Forest	1200	56	56	20 Year Old Forest	100	55	55
al - Heli/Silt	silt loam	2	20 Year Old Forest	1200	55	55	20 Year Old Forest	100	55	55
al - Rx Fire	loam	3370	Shrubs	1200	62	62	20 Year Old Forest	100	55	55
Rx Fire/Sa	sandy loam	1227	Shrubs	1200	59	59	20 Year Old Forest	100	55	55
- Rx Fire/S	silt loam	86	Shrubs	1200	26	26	20 Year Old Forest	100	55	55

Mean Annual Averages for 50 years

Precipitation	Storms	Rainfall Runoff	Rainfall Runoff Events	Snowmelt Runoff	Snowmelt Runoff Events	Upland Erosion Rate	Sediment Leaving Profile
inches	#	inches	#	inches	#	tons/acre	tons/acre
37.4	7110	0.06	6	0.15	25	0.004	0.004
37.4	7110	0	1	0.01	2	0	0
37.4	7110	0.06	6	0.15	25	0.009	0.004
37.4	7110	0	1	0.01	2	0	0
37.4	7110	0.11	17	0.75	142	0.004	0.004
37.4	7110	0.06	6	0.15	25	0.009	0.009
37.4	7110	0	1	0.01	2	0	0
37.4	7110	0.12	15	0.75	141	0.018	0.018
37.4	7110	0.04	19	0.08	21	0.027	0.027
37.4	7110	0	4	0	1	0	0
37.4	7110	0.08	20	0.5	125	0.027	0.027

Return period analysis based on 50 years of climate

Return Period # 1: 50 year

Precipitation	Runoff	Erosion	Sediment
inches	inches	tons/acre	tons/acre
55.82	3.93	0.17	0.1626
55.82	0.17	0	0
55.82	3.93	0.2	0.1943
55.82	0.17	0	0
55.82	6.86	0.17	0.1431
55.82	3.93	0.22	0.2107
55.82	0.17	0	0
55.82	7.19	0.52	0.5163
55.82	2.63	0.61	0.6158
55.82	0.01	0	0.0003
55.82	5.46	0.77	0.776

Return Period # 2: 25 year

Precipitation	Runoff	Erosion	Sediment
inches	inches	tons/acre	tons/acre
54.45	2.46	0.08	0.0501
54.45	0.13	0	0
54.45	2.45	0.09	0.0577
54.45	0.12	0	0
54.45	4.63	0.14	0.0847
54.45	2.44	0.1	0.0615
54.45	0.12	0	0
54.45	4.59	0.2	0.197
54.45	1.47	0.37	0.2962
54.45	0	0	0
54.45	3.26	0.27	0.2513

Return Period # 3: 10 year

Precipitation	Runoff	Erosion	Sediment
inches	inches	tons/acre	tons/acre
42.71	0.51	0.01	0.0009
42.71	0	0	0
42.71	0.51	0.01	0.001
42.71	0	0	0
42.71	2.84	0.04	0.0035
42.71	0.51	0.01	0.0016
42.71	0	0	0
42.71	2.86	0.04	0.0304
42.71	0.23	0.04	0.0141
42.71	0	0	0
42.71	1.71	0.11	0.0287

Return Period # 4: 5 year

Precipitation	Runoff	Erosion	Sediment
inches	inches	tons/acre	tons/acre
40.38	0.08	0	0
40.38	0	0	0
40.38	0.08	0	0
40.38	0	0	0
40.38	1.57	0	0
40.38	0.08	0	0
40.38	0	0	0
40.38	1.6	0	0
40.38	0.01	0	0.0013
40.38	0	0	0
40.38	1.16	0.04	0.0122

Return Period # 5: 2.5 year

Precipitation	Runoff	Erosion	Sediment
inches	inches	tons/acre	tons/acre
38.44	0	0	0
38.44	0	0	0
38.44	0	0	0
38.44	0	0	0
38.44	0.63	0	0
38.44	0	0	0
38.44	0	0	0
38.44	0.64	0	0
38.44	0	0	0
38.44	0	0	0
38.44	0.37	0	0.0002

Average

Precipitation	Runoff	Erosion	Sediment
inches	inches	tons/acre	tons/acre
37.4	0.21	0	0.0044
37.4	0.01	0	0
37.4	0.21	0.01	0.0044
37.4	0.01	0	0
37.4	0.86	0	0.0044
37.4	0.21	0.01	0.0089
37.4	0.01	0	0
37.4	0.87	0.02	0.0178
37.4	0.13	0.03	0.0267
37.4	0	0	0
37.4	0.57	0.03	0.0267

Probabilities of Occurrence in First Year Following Disturbance

Runoff	Erosion	Sediment Delivery
%	%	%
24	12	12
6	0	0
24	12	12
6	0	0
74	12	14
24	12	12
6	0	0
74	12	14
22	16	26
6	0	6
74	34	42

Mean Annual Averages

Mean Annual Average Erosion	Mean Annual Average Sediment
tons	tons
1.34	1.34
0	0
8.35	3.71
0	0
0.02	0.02
12.04	12.04
0	0
0.04	0.04
90.99	90.99
0	0
2.32	2.32

Return Period # 1: 50 year

Erosion	Sediment Delivery
tons	tons
57.12	54.63
0	0
185.6	180.31
0	0
0.85	0.72
294.36	281.92
0	0
1.04	1.03
2055.7	2075.25
0	0.37
66.22	66.74

Return Period # 2: 25 year

Erosion	Sediment Delivery
tons	tons
26.88	16.83
0	0
83.52	53.55
0	0
0.7	0.42
133.8	82.29
0	0
0.4	0.39
1246.9	998.19
0	0
23.22	21.61

Return Period # 3: 10 year

Erosion	Sediment Delivery
tons	tons
3.36	0.3
0	0
9.28	0.93
0	0
0.2	0.02
13.38	2.14
0	0
0.08	0.06
134.8	47.52
0	0
9.46	2.47

Return Period # 4: 5 year

Erosion	Sediment Delivery
tons	tons
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
4.38	0
0	0
3.44	1.05

Return Period # 5: 2.5 year

Erosion	Sediment Delivery
tons	tons
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
101.1	89.98
0	0
0	0.02

Return Period: Average

Erosion	Sediment Delivery
tons	tons
1.48	0
0	0
9.28	4.08
0	0
0	0.02
13.38	11.91
0	0
0.04	0.04
101.1	89.98
0	0
2.58	2.3

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USFS DISTURBED WEPP BATCH PROGRAM - Input Reference

Soil Information

Categories of Common Forest Soils in relation to Disturbed WEPP Soil textures

Soil Texture	Soil Description	Universal Soil Classification
Clay loam	Soils derived from shales, limestone and similar decomposing fine-grained sedimentary rock. Lakebeds and similar areas of ancient lacustrian deposits.	CH
Silt loam	Ash cap and loess soils, soils derived from siltstone or similar sedimentary rock. Highly-erodible mica/schist geologies.	ML,CL
Sandy loam	Glacial outwash areas; decomposed granites and sand stone, and sand deposits	GP, GM, SW, SP
Loam	Glacial tills, alluvium	GC, SM, SC, MH

Treatment

Vegetation Treatment Options in the Disturbed WEPP Interface

Vegetation Treatment	Description
Twenty-year old forest	Any well-established forest with trees spaced about 2 m (6 ft) apart, about 5 m (20 ft) tall or taller. Ground is generally covered with a substantial layer of forest duff.
Five-year old forest	A growing forest describing conditions several years after a wilfire with surface cover approaching 100 percent in most climates. May also describe a forest in the first year or two following a significant harvest for timber of biomass. Be sure to not the correct ground cover following such an operation.
Shrub-dominated rangeland	Areas of shrubs with soil covered with residue beneath shrubs, and gaps between shrubs with minimal ground cover. Plants are about 1.2 m (4 ft) tall, with a 0.5 m (20 inch) spacing. The percent cover entered is an indication of the percent of the canopy or ground cover by the vegetation. Examples of this vegetation may be sage-dominated rangeland, or sparsely vegetated pinyon-juniper communities. This treatment may also be a reasonable estimate of a harvested forest 3 years after harvest and prescribed burn, or a forest 4 years after a severe wildfire.
Tall-grass prairie	Areas covered by tall bunch grasses, with gaps between bunches. Plants are about 0.6 m (24 inch) tall and 0.3 m (12 inch) average spacing. The percent cover entered is an indication of the percent of the canopy or ground covered by the vegetation. This vegetation treatment would best describe blue-stem or similar range communities in the west, or ryegrass, brome, or orchard grass pastures in the east. It may also describe post-fire conditions where wheat or oats have germinated to provide post-fire erosion mitigation. This treatment may also be a reasonable estimate of a harvested forest 2 years after a prescribed burn, or 3 years after a wildfire.
Short-grass prairie	Areas covered by short sod-forming grasses. Plants are about 0.4 m (16 inch) tall and with an average spacing of 0.2 m (8 inch). The percent cover entered is an indication of the percent canopy or ground covered by the vegetation. This vegetation treatment would best describe buffalo grass or similar sodding grasses in the west, or Kentucky bluegrass in the east. It may also best describe sparsely-covered reclaimed mine lands. This treatment may best describe forest conditions 1 year after a prescribed fire or two years after a wildfire.
Low-severity fire	This condition describes areas that have either had a low-severity fire, or a successful prescribed fire. Vegetation is assumed to reach an maximum height of 0.2 m (8 inch) and at a spacing of 0.2 m (8 inch). This is probably the most appropriate treatment to describe a sparsely vegetated, newly exposed surface following excavation where material has not been highly compacted, such as a road cut. The user enters an estimate of the vegetated cover, which may be zero. This treatment may best describe forest conditions the year of a prescribed fire, or conditions 1 year after a wildfire. If there has been a high severity fire, and the soils are NOT water repellent, this is probably the best selection, but with a cover reduced to about **60** percent, or that observed on the site.
High-severity fire	This condition describes areas that have experienced a high-severity fire and soils may be water repellent. Vegetation is assumed to reach a maximum height of 0.15 m (6 inch) with a spacing of 0.15 m (6 inch).
Skid trail	This condition describes a skid trail with vegetation reaching a maximum height of 0.15 m (6 inch) at a 0.1 m (4 inch) spacing. The soil is assumed to be compacted. This treatment would also describe any site mechanically disturbed and compacted --as long as the user estimates the amount of cover--such as landings, forwarder tracks, skyline paths, etc. If the soils remain compacted during the regeneration period, then the user is advised to use the skid trail for the first five years of regeneration, using increasing amounts of cover to describe local conditions. The time required to achieve 100 percent cover may be as short as 2 years in Eastern forests.

Rock Percentage

Rock fragments in WEPP are considered rocks in the soil. As such, WEPP assumes that as water moves through soil, it must flow around the rocks. Therefore, WEPP reduces the hydraulic conductivity of the soil in direct proportion to the rock content (i.e. 20 percent rock will reduce the hydraulic conductivity by 20 percent). WEPP will not accept a value for rock content higher than 50 percent, so even when the user puts 100 percent rock into the rock content box, WEPP assumes that it is only 50 percent. In this context, as rock content increases up to 50 percent, runoff increases, as does rill erosion. Above 50 percent, there is no further impact modeled from increased rock content.

Hillslope

Columns referred to in the diagram below are the corresponding column in the Hillslope Data page in which to put the specified value.